

# Email

E-mail, the most popular network service, has revolutionized how people communicate through its simplicity and speed. Yet to run on a computer or other end device, e-mail requires several applications and services. Two example Application layer protocols are Post Office Protocol (POP) and Simple Mail Transfer Protocol (SMTP), shown in the figure 1. As with HTTP, these protocols define client/server processes.

When people compose e-mail messages, they typically use an application called a Mail User Agent (MUA), or e-mail client. The MUA allows messages to be sent and places received messages into the client's mailbox, both of which are distinct processes.

In order to receive e-mail messages from an e-mail server, the e-mail client can use POP. Sending e-mail from either a client or a server uses message formats and command strings defined by the SMTP protocol. Usually an e-mail client provides the functionality of both protocols within one application.

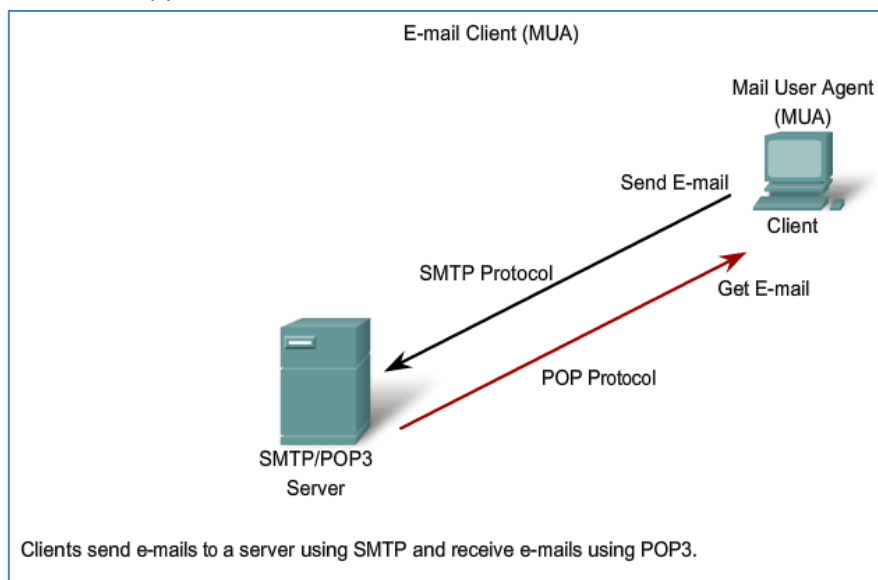


figure 1 – SMTP/POP Protocols

## 1. E-mail Server Processes - MTA and MDA

The e-mail server operates two separate processes:

- Mail Transfer Agent (MTA)
- Mail Delivery Agent (MDA)

The Mail Transfer Agent (MTA) process is used to forward e-mail. As shown in the figure 2, the MTA receives messages from the MUA or from another MTA on another e-mail server. Based on the message header, it determines how a message has to be forwarded to reach its destination. If the mail is addressed to a user whose mailbox is on the local server, the mail is

passed to the MDA. If the mail is for a user not on the local server, the MTA routes the e-mail to the MTA on the appropriate server.

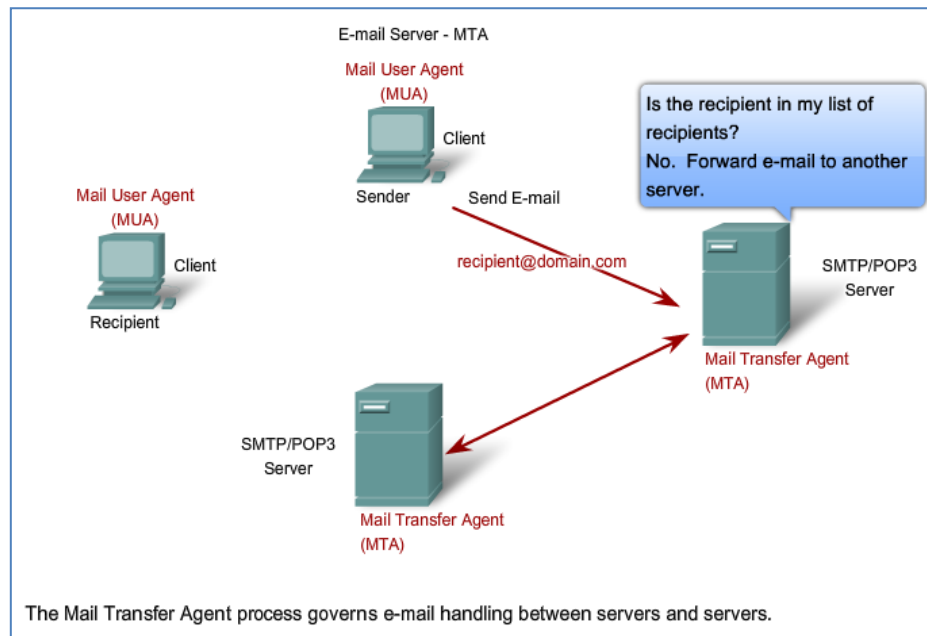


figure 2 – MTA and MDA roles

In the figure 3, we see that the Mail Delivery Agent (MDA) accepts a piece of e-mail from a Mail Transfer Agent (MTA) and performs the actual delivery. The MDA receives all the inbound mail from the MTA and places it into the appropriate users' mailboxes. The MDA can also resolve final delivery issues, such as virus scanning, spam filtering, and return-receipt handling. Most e-mail communications use the MUA, MTA, and MDA applications. However, there are other alternatives for e-mail delivery.

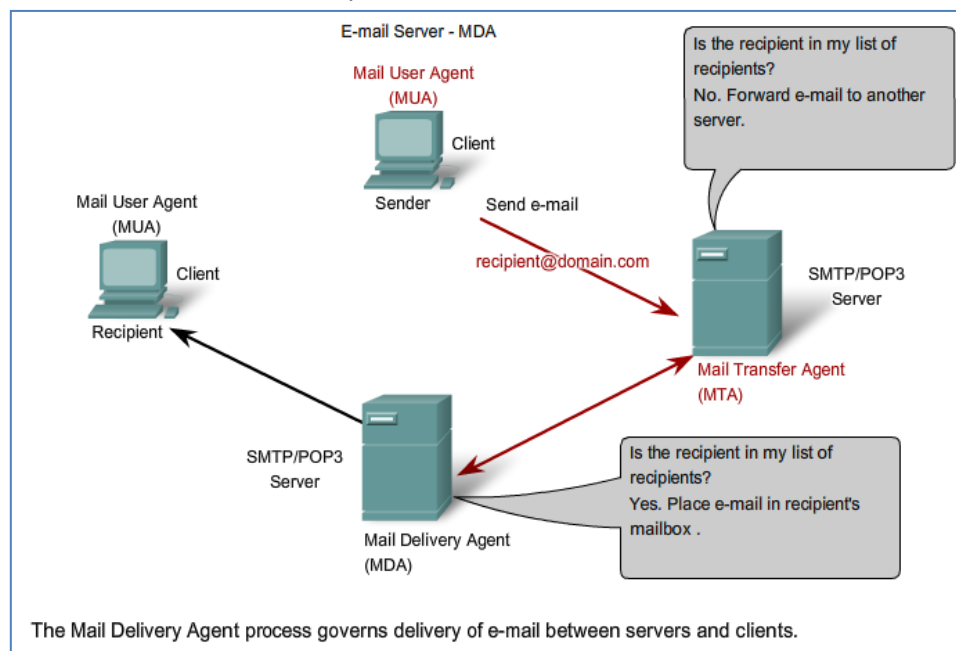


figure 3 – MDA to Mailbox

As mentioned earlier, e-mail can use the protocols, POP and SMTP (see the figure 4 for an explanation of how they each work). POP and POP3 (Post Office Protocol, version 3) are

inbound mail delivery protocols and are typical client/server protocols. They deliver e-mail from the e-mail server to the client (MUA). The MDA listens for when a client connects to a server. Once a connection is established, the server can deliver the e-mail to the client.

The Simple Mail Transfer Protocol (SMTP), on the other hand, governs the transfer of outbound e-mail from the sending client to the e-mail server (MDA), as well as the transport of e-mail between e-mail servers (MTA). SMTP enables e-mail to be transported across data networks between different types of server and client software and makes e-mail exchange over the Internet possible.

The SMTP protocol message format uses a rigid set of commands and replies. These commands support the procedures used in SMTP, such as session initiation, mail transaction, forwarding mail, verifying mailbox names, expanding mailing lists, and the opening and closing exchanges. Some of the commands specified in the SMTP protocol are:

- HELO - identifies the SMTP client process to the SMTP server process
- EHLO - Is a newer version of HELO, which includes services extensions
- MAIL FROM - Identifies the sender
- RCPT TO - Identifies the recipient
- DATA - Identifies the body of the message

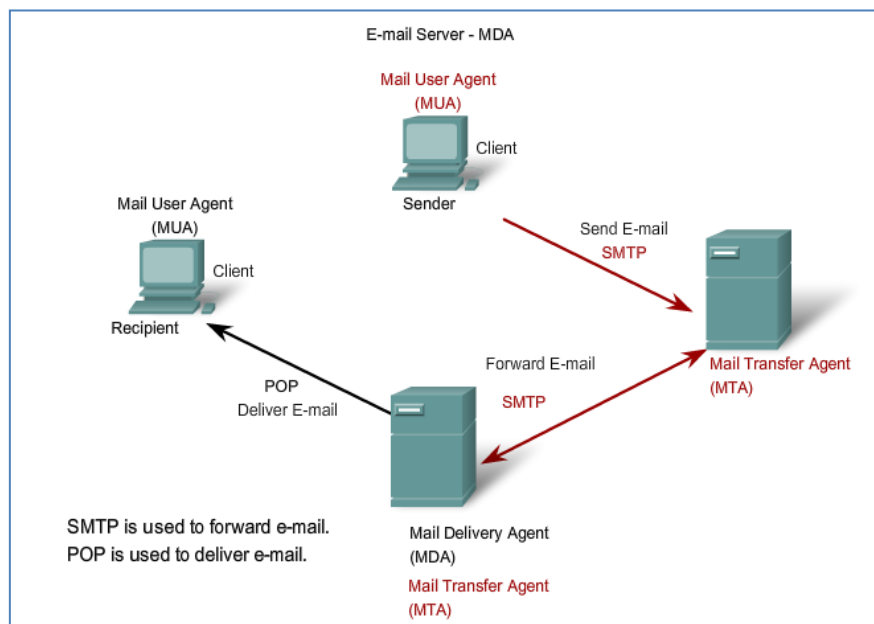


figure 4 – SMTP and POP roles

### 1.1. IMAP

As POP3, the **Internet Message Access Protocol** or **IMAP** is one of the two most prevalent Internet standard protocols for e-mail retrieval. All modern e-mail clients and servers support both protocols as a means of transferring e-mail messages from a server, such as those used by Gmail, to a client, such as Mozilla Thunderbird and Microsoft Outlook.

E-mail clients using IMAP generally leave messages on the server until the user explicitly deletes them. This and other facets of IMAP operation allow multiple clients to access the same mailbox.

IMAP also supports partial message fetch (e.g., by subject) reducing the amount of transferred data.

## **1.2. Well Known Email Ports**

- SMTP listens on port 25
- SMTPS listens on port 465
  
- POP3 listens on port 110
- POP3S listens on port 995
  
- IMAP listens on 143
- IMAPS listens on 993